An Inaugural Dissertation on Tetanus. Submitted to the Examination of the Provost, Trustees, and Medical Faculty of the University of Pennsylvania for the Degree of Doctor of Medicine on the day of April Eighteen Hundred an Eleven

by

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Since the time of Hippocrates down to the present day, Tetanus has excited the attention of the most learned & ingenious of Medical Writers — It would be presumptuous in a mere Tyro in Medicine to suppose himself capable of throwing much light on the treatment of so unmanageable a disease — Nor was it with this view that I chose Tetanus as the subject of my inaugural dissertation —

The word Tetanus means literally a tension or spasm — as it is used in medical writings it implies a morbid

contraction or Spasm of the muscular fibres of a living animal —

Persons of every age and of both sexes are liable to attacks of this disease, but those of a robust and irritable habit are said to be most frequently its victims — Dumb animals are also sometimes affected with a disease which is apparently a real Tetanus —

Tetanus is a disease principally confined to the nervous system, and is seldom more especially in the muscles of voluntary motion, giving rise to a considerable degree of rigidity to the whole body. The Greeks who were among

the first cultivators of Medical Science described Tetanus as a universal Spasm of all the Muscles of voluntary motion; they however had several varieties or divisions which I shall take some notice of hereafter.—

In general the Symptoms of Tetanus make their appearance in a slow and gradual manner; this however depends a good deal upon its cause, for when brought on from exposure to cold it is much more slow and gradual in its progress than when from an organic lesion though the latter is longer in making its appearance after the

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application of the cause.

Among the first symptoms is a degree of lassitude and stiffness of the muscles of the neck and jaws, which is soon followed by an uneasy sensation and tension about the lower end of the sternum, shooting back towards the spine. The rigidity of the muscles of the neck causes the head to be moved with difficulty; the jaws cannot be opened without considerable pain; there is also a stiffness and slight degree of pain at the root of the tongue, which gives rise to a difficulty in deglutition. The pain about the cartilago ensiformis increasing, the muscles of the back part of the neck are

thrown into violent contraction drawing the head backwards. The muscles of the lower jaw at the same time are affected with spasm, drawing the lower jaw so close in contact with the upper, as to render it impossible to open the mouth. The disease is then called Tris mus or Locked jaw.

The muscles of the extremities now become rigid, and are drawn strongly backwards; the pain about the precordia, increasing in violence, returns every ten or fifteen minutes, and with it the spasms of the muscles of the lower jaw and neck are with more violence and pain renewed. The disease thus gradually increasing, the muscles of the spine become

affected, bending the body backwards, and the neck and thorax forwards. When the disease is called opisthotonos.

The third variety of this disease is, when the muscles seated on the front of the body and neck act with so much violence, as to draw the chin to the sternum, depressing the thorax, the neck consid-erably curved, the hands clinched, and the lower extremities extended, and has been called emprosthotonos. This is a va-riety ~~which~~ has seldom occurred, and is thought by Dr Mosely impossible to exist.

The abdominal muscles through the whole of the disease are violently contracted, and extremely hard to the touch.

When the disease continues to increase, the whole of the muscles of voluntary motion, except those which move the fingers, which at times are unaffected, become affected, and acting at the same time, keep the head trunk and extremities straight & inflexible - the tongue, which retains its mobility a considerable time, at length becomes affected with spasm, and is often thrust between the teeth. The forehead becomes furrowed, the eyes are distorted and immoveable in their sockets, the teeth exposed by the action of the muscles drawing the cheeks towards the ears - In a short time a violent convulsion comes on and puts an end to

to the unfortunate sufferer.

The pulse in this disease is very variant; sometimes slow & hard; at others frequent, small, and irregular. The bowels are generally constipated: from the difficulty of deglutition, and from a fear of exciting a return of spasm, the patient refuses both nourishment and drink. Those muscles which are concerned in respiration & deglutition are most violently affected. Breathing is laborious & painful. The urine is sometime voided with difficulty & pain and sometimes totally suppressed. The spasms in this disease are not constant, but subsides for two or three

minutes, giving the patient a ~~slight~~ degree of ease; but by the slightest motion or impression the spasms return with redoubled violence. The patient remains perfectly conscious, and the senses are unimpaired, until the last violent paroxysm puts an end to his sufferings.

In treating of the causes of Tet-anus it is unnecessary to say ~~there~~ to be different, as a very full and interesting account of them is given by Dr Rush, in his Medical observations and inquiries. He says "all the remote and predispos-ing causes of Tetanus act by inducing preternatural debility and irritability

in the muscular parts of the body:—
Spasm says Hippocrates are all induc-
-ed either by repletion or inanition;
and for those brought on by the for-
-mer we should make use of depleting
remedies, and in the case of the latter
remedies which support the System
although Dr Mosely laid great stress
on those remarks of Hippocrates, still
but little can be learned from them
as respects either the pathology or
cure of Tetanus — Dr Hamilton
of Edinburgh thinks that the costiv
state of the bowels is greatly concern
in the production of this disease;
and certainly there are some cases

stances which favour this opinion; for we frequently see sporadic diseases induced from the same cause, as Cholic, Hysteria, &c, and we generally find Tetanus occuring in those Climates and seasons in which the intestinal canal is extremely torpid and constipated – Dr Mosely remarks that women seldom have more than two stools a week in the hottest Indias. But perhaps Dr Hamilton's Theory leads him too far when he proposes to cure Tetanus by purging alone, for certainly there are cases which come on without any previous constipation. I have seen a case which came on one hour after the patient received a punctured wound in the wrist, the boy being previously in every respect in perfect health

Cure

I am fully impressed with the truth of the sentiments of the learned proffessor of the institutes & practice of Medicine respecting the frequent failure of Physicians in the cure of this Disease — The bad success of Physicians he imputes, "to the use of the same remedies, without "any respect to the nature of the causes which "produce" the disease, "and to an undue "reliance upon some one remedy under "a belief of its specific efficacy". Bearing in mind those sentiments, I am enabled to review the various remedies which have been proposed in the cure of this disease.

and the different plans of practice proposed by Authors —

Among the first remedies which I shall notice is,

1st Bloodletting. Galen observes, that spasms from plethora and inflamma-tion are to be cured by depleting or evac-uating remedies. Dr Mosely relates the case of a Man who received a fracture of the cranium, which was succeeded by violent inflammation &c., cured by the loss of a large quantity of Blood and other evacuants — A Case is also related by Dr Rush, when bloodletting was used successfully. Currie of Liverpool men-tions a case cured by the same remedy

Bloodletting however should not be employed, unlys the pulse and inflamatory symptoms indicate it.

2ed Purgets. These are strongly indicated in all cases when the bowels are obstinately costive, or when the disease arises from the presence of worms or any irritating matter, in the intestinal canal. Dr Hamilton places so much confidence in the use of purgatives, that he almost entirely relies on them in the cure of Tetanus. Mosely recommends purges in high terms in cases accompanied with inflamatory symptoms, or when venesection is necessary. Doctors Wright

Munro and Cochrane all bear testi-
-mony to their use in the cure of Tetanus.

3rd Emetics. These are remedies which have been seldom used in Tetanus; but from what we know of their general power over the Muscular System and their utility in cases of Spasmodic stricture, we would be led to conclude that they might be employed with considerable advantage in some cases. There is a case of Tetanus mentioned by Dr Currie, which continued with great violence for several days, when a Nausea & Vomiting came on, which completely relaxed the Muscular System, and the patient recovered with great rapidity.

Wine and Bark were however also used at the same time. Dr Rush re-lates a case, where an Emetic had the effect of unlocking the Jaws of the Patient instantly; the patient was at the same time seized with a remittent fever —

4th. Incision. When Tetanus is brought on from a punctured wound or any other organic lesion, making an incision so as to dilate the wound freely often proves instantaneously successful. This opera=tion is supposed to prove successful by di-viding the punctured nerve or tendon which is the cause of the Spasm and thereby intercepting the communication be=tween the part diseased & the sensorium communi

This does not seem to me a satisfac=tory theory of the use of the knife. I am inclined to suppose, that in some measure at least the incision proves useful by remov=ing that tension of the part, which usually arises from punctures.

5th. Opium. This article has been resort=ed to by Physicians as one of the principal remedies in the cure of Tetanus. Yet there is reason to doubt, whether in cases arising from organic lesion, it has really cured the disease without the aid of other remedies. We need not be surprised that physicians, relying solely on opium, should be disappoint=ed. This disappointment is not however to be attributed to the feebleness of this remedy, but

to the circumstance of Physicians, (as Dr Ham-
-ilton remarks) disregarding the general
history of the disease, and confining them
=selves to the consideration of a single symptom,
paying no attention to the state of the system
in general. Opium Dr Mosely says he never
found of any utility in this disease. The
dose of Opium in this disease should be
large; as high as one ounce in twen-
=ty-four hours, Dr Mosely mentions, may
be given. Lind gave a scruple in twenty
-four hours —

6th Wine From the nutritious
as well as the stimulating effects
of this remedy, we would conclude that
it would prove useful in the cure

of Titanus. Professor Rush and Dr. Currie of Liverpool have employed this remedy with advantage. To be useful they advise it to be given in large quantities.

7.th Bark. This as well as some of the other Tonics has been used with advantage. Dr Rush relates a case of its beneficial effects. I have seen the Oxide of Arsenic administered in the dose of one sixth of a grain three times a day & increased to a grain and a half apparently with very good effects. There was indeed other remedies used at the same time, as opium, wine, &c.; the patient recovered.

8th The Essential Oils. Professor Rust has used the ol: succini in the dose of six or eight drops with the most happy effects in a case of Tetanus. Under this head I shall place the Balsam of Peru, though it is not strickly speaking an oil, yet it is so nearly allied to the essential oils, that it will not be improper to speak of it under this head. Dr Kirkland mentions several cases of Tetanus in which he used the Balsam of Peru with complete success, given in the dose of one dram three times a day. Dr Rogers relates a case of Epilepsy in which he used this Balsam with the happiest effects. This favours the probable utility of it in Tetanus.

9th Blisters. Dr Gardleston speaks highly of the use of Blisters in the cure of Tetanus. I would expect more benefit from the application of Mustard or the actual cautery, remedies recommended by the Ancients in many violent diseases —

10th Salivation. The efficacy of this remedy has been very satisfactorily proven by several Authors of respectibility, but perhaps more strikingly in a case related by the Late Dr Young of Maryland. Dr Rush also relates a case where a salivation effected a cure. Dr Mosely says that Mercury oftener kills than cures the patient; this may be the case in the West indies, but certainly its very different in the United States. There is how=ever a great objection to the use of Mer=

curing, that of its being so slow in its operation; it should however be used in conjunction with other remedies.

IV.th Cold Bath. This is a remedy almost as old as the science of Medicine. Hippocrates was particularly attached to its use in this disease, and his restrictions in the use of it, are truly deserving of attention. He observes that it should only be used in the summer season, and in patients that are of a plethoric and robust habit. This practice was nearly forgotten, when, to the great honour of Dr. Wright of Jamaica, he ~~called~~ brought its use into public notice. The success of Dr. Wright in the cure of Tetanus

with the Cold bath, as well as the success of Doctors Cochrane and Currie, have clearly evinced its efficacy. Dr Rush has used the cold bath with success in the cure of Tetanus - In the use of this remedy it appears, from the frequent failures in the hands of Physicians, and more particularly in those of Dr Gilchrist, that we should pay strict attention to the state of the System.

12th Warm Bath. This is a remedy which promises most good when the heat of the System is a good deal below its natural standard, and the patient complains of chilliness, when the pulse is small & slow - This remedy was known and recommended by the Celsus -

13th Tobacco. We are indebted to Doctr. Federick May, for our knowledge of the use of this Article in the cure of Tetanus. although Willis relates a case of Tetanus which was the effect of Hysteria that was cured by the use of Tobacco smoke blown up the nose. Dr May first used this remedy while a Student of Medicine, by the direction of his preceptor Dr Warren, in a case of Tetanus induced by a punctured wound, he used it after every other remedy had failed, with, complete success. the Doctor gave ~~it~~ by way of enema half a pound of the saturated infusion. Another case occurred sometime after to Dr May, in which he had recourse, at the close of the disease, to the infusion of Tobacco, prepared in the same way as in the ~~other case~~ former; making use of two ounces of Tobacco to eight of water and giving it all at once by way

of enema, from the extraordinary dose, and the exausted state of the patient, we should expect it to prove instantly fatal as was the case. In the year 1808 Doct. ~~[illegible]~~ Rogers published in the Philadelphia Medical and Physical Journal, a Case of Tetanus which he treated with success by means of this remedy given by way of enema, using two drams to eight ounces of water — From the success of those Gentlemen in the cure of Tetanus, and of Delirium in the treatment of Epilepsy by the use of Tobacco, and from what we know of its effects on the system when taken internally or applyed externally, and its powerful effects in relieving some cases of Hernia, &c, I think we have reasons to hope that it will prove to be one of the most important articles of the Materia Medica in the treatment of Tetanus —.